



S/N 09/350,251

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant: Arye Malek et al.

Examiner: John Nguyen

Serial No.: 09/350,251

Group Art Unit: 3653

Filed: July 08, 1999

Docket: 139.059US1

Title: TRAY FLIPPER AND METHOD FOR PARTS INSPECTION

34
P. Allen
10/03/03

**APPEAL BRIEF TO THE BOARD OF
PATENT APPEALS AND INTERFERENCES OF THE
UNITED STATES PATENT AND TRADEMARK OFFICE**

MAIL STOP APPEAL BRIEF

Assistant Commissioner for Patents
Washington, D.C. 20231

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Appellant's Brief on Appeal

This brief is presented in support of the Notice of Appeal filed on July 15, 2003, received by the Office on July 21, 2003, from the final rejection of pending claims 3-10, 12-25, and 27-42 of the above-identified patent application. The Final Office Action from which Appellant appeals was mailed April 15, 2003.

The Appeal Brief is filed in triplicate and accompanied by the requisite fee set forth in 37 C.F.R. § 1.17(f). Appellant respectfully requests reversal of the Examiner's rejection of pending claims 3-10, 12-25, and 27-42. It is believed that no further fee is due; however, if additional fees are deemed to be due, they may be charged to Deposit Account No 19-0743.

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Real Party in Interest

The present patent is assigned to PPT Vision, Inc., a corporation organized and existing under the laws of the State of Minnesota, doing business at 12988 Valley View Road, Eden Prairie, MN 55344, in an assignment from the inventors recorded on October 8, 1999, Reel 010306 and Frames 0875-0878.

Related Appeals and Interferences

There are no other appeals or interferences known to Appellant which will have a bearing on the Board's decision in the present appeal.

Status of the Claims

Claims 3-10, 12-25, and 27-42 are pending in this application. None of the claims are allowed. Claims 3-10, 12-25, and 27-42 are presently rejected and are the subject of the present appeal.

Status of the Amendments

The claims are as amended in the Amendment and Response mailed June 16, 2003. The Examiner withdrew claims 22-25, 31-36, and 41 as being drawn to a non-elected species, there being no allowable generic or linking claim. Applicant respectfully submits that claim 40 (which is not withdrawn) is generic, linking to the withdrawn claims, and allowable, and these claims are presented for this appeal.

Summary of the Invention

The present application is directed to a system and method for flipping a tray of parts in a machine-vision system such that opposing sides of the parts may be examined. Trays of devices, such as trays of semiconductor chips, associated with current vision inspection systems can be inspected on their first side (e.g., with connectors facing upwards), then the devices flipped by placing an empty tray upside-down over a tray full of devices, and inverting the trays while holding them together to simultaneously invert all devices, then removing the original lower tray

so that the second side of the devices (e.g., with connectors facing downwards) can be inspected. In some prior-art systems, the flipping of trays of devices is done manually by an operator. In Jackson, an automated flipper is described, however the path through the flipper machine is long and the speed possible required is thus relatively slow. Further, the devices exit the flipping station in a different tray than the one they started in, thus losing the association between markings on the tray and the devices in the tray.

In contrast, the present invention provides (e.g., linking claim 40) a machine-vision system for inspecting a plurality of tray-held devices, each device having a first side and a second side, the machine-vision system comprising:

a first inspection station for inspecting a first side of the devices held in a tray that has a long-dimension side and a short-dimension side;

a second inspection station for inspecting a second side of the devices; and

a tray-transfer device that operates to **invert the devices and move the devices from the first inspection station to the second inspection station in a direction substantially perpendicular to the long dimension side of the tray** so as to reduce the distance of movement needed.

Claims 3-10, 12-21, and 27-30, 37-39, 42 describe apparatus and methods that use a second tray, and change the devices from a first to the second tray when flipping the devices, while moving the trays along their shorter dimension.

Claims 22-25, 31-36, and 41 describe apparatus that do not require a second tray, but place the devices back into the first tray after flipping the devices.

Issues Presented for Review

1. Whether claims 22-25, 31-36, and 41 were properly withdrawn as being drawn to a non-elected species, and whether there was an allowable generic of linking claim.
2. Whether claims 12, 20, 21, 37 and 39 were properly rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.
3. Whether claims 3-10, 12-21, and 27-30, 37-40, 42 were properly rejected under

35 USC § 103(a) as being unpatentable over Applicant's admitted prior art [discussed on pages 2-5 of the specification] in view of Jackson et al. (US 6,139,243) .

Grouping of the Claims

Claims 22-25 and 31-36 are grouped together for the purposes of this appeal.

Claims 3-9 and 27, 12-16 and 28, 17-19 and 29, 20-21 and 30 are all grouped together for the purposes of this appeal.

Claims 40-42 are grouped together for the purposes of this appeal.

Claims 10 and 37-39 are grouped together for the purposes of this appeal.
stands alone for the purposes of this appeal.

Arguments

Withdrawal of Claims as drawn to non-elected species

In the Restriction Requirement mailed September 4, 2002, the Examiner requested election of one of the following species:

- I. Figs. 9A and 19B;
- II. Figs. 19C-19L.

Applicant elected species I, and added claim 40 that reads on both species as a generic and linking claim. Applicant filed a paper January 27, 2003, identifying claims 3-21, 27-30, 37-40, and 42 as reading on the elected species.

Claims 22-25, 31-36, and 41 were withdrawn as being drawn to a non-elected species. Applicant respectfully traverses.

Claim 41, withdrawn by the Examiner, is dependent upon claim 40, which is not withdrawn or restricted. Dependent claims cannot be restricted when they depend on an independent claim that is not subject to a restriction requirement.

Further, generic claim 40 reads on the withdrawn independent claims 22 and its dependent claims 23-25 and 31, and independent claim 32 and its dependent claims 33-36. Applicant traversed the non-allowance of claim 40. Accordingly, under MPEP 818.03(d), once

claim 40 is held allowable, these claims should not be withdrawn, and reconsideration and allowance of the claims is respectfully requested.

Rejection Under 35 U.S.C. § 112 paragraph 2

1) The Applicable Law for Rejections Under 35 U.S.C. § 112 paragraph 2

35 U.S.C. § 112 paragraph 2 provides “The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.”

The MPEP provides:

2173.02 Clarity and Precision

The examiner's focus during examination of claims for compliance with the requirement for definiteness of 35 U.S.C. 112, second paragraph is whether the claim meets the threshold requirements of clarity and precision, not whether more suitable language or modes of expression are available. When the examiner is satisfied that patentable subject matter is disclosed, and it is apparent to the examiner that the claims are directed to such patentable subject matter, he or she should allow claims which define the patentable subject matter with a reasonable degree of particularity and distinctness. Some latitude in the manner of expression and the aptness of terms should be permitted even though the claim language is not as precise as the examiner might desire. Examiners are encouraged to suggest claim language to applicants to improve the clarity or precision of the language used, but should not reject claims or insist on their own preferences if other modes of expression selected by applicants satisfy the statutory requirement.

The essential inquiry pertaining to this requirement is whether the claims set out and circumscribe a particular subject matter with a reasonable degree of clarity and particularity. Definiteness of claim language must be analyzed, not in a vacuum, but in light of:

- (A) The content of the particular application disclosure;
- (B) The teachings of the prior art; and
- (C) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made.

In reviewing a claim for compliance with 35 U.S.C. 112, second paragraph, the examiner must consider the claim as a whole to determine whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. 112, second paragraph. See, e.g., *Solomon v. Kimberly-Clark Corp.*, 216 F.3d 1372, 1379, 55 USPQ2d 1279, 1283 (Fed. Cir. 2000). See also *In re Larsen*, No. 01-1092 (Fed. Cir. May 9, 2001) (unpublished) (The preamble of the Larsen claim recited only a hanger and a loop but the body of the claim positively recited a linear member. The court observed that the totality of all the limitations of the claim and their interaction with each other must be considered to ascertain the inventor's contribution to the art. Upon review of the claim in its entirety, the court concluded that the claim at issue apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. 112, paragraph 2.). If the scope of the invention sought to be patented cannot be determined from the language of the claims with a reasonable degree of certainty, a rejection of the claims under 35 U.S.C. 112, second paragraph is appropriate. *In re Wiggins*, 488 F.2d 538, 179 USPQ 421 (CCPA 1973).

2) *The 35 U.S.C. §112 Rejection of Claims*

In the Final Office Action mailed 4/15/2003, the Examiner asserted that "It is not clear how moving the tray in the claimed perpendicular direction reduces the travel distance as claimed (claims 12, 20, 21). The test is whether the claims apprise one of an ordinary level of skill in the pertinent art at the time the invention was made, of the scope of the claim, in view of the content of the particular application disclosure, and the teachings of the prior art. It is clear from the specification and the claims that moving the trays in the claimed perpendicular direction reduces the travel distance and/or shortens the time needed to move the trays, since the stations can be place closer to one another, and/or more trays can be placed in the path of travel, since the trays need only be moved their short dimension between each operation. If stations are kept a fixed distance apart, there can be more trays along the path between machines, and thus the time per tray is reduced at a given tray speed. If the stations are moved closer together as allowed by the perpendicular orientation of the trays, the distance traveled by the tray is reduced, and thus the time per tray is reduced at a given tray speed.

For example, by moving one or more devices in a tray having a long-dimension side and a short-dimension side from the first inspection station to the second inspection station in a direction perpendicular to the long-dimension side, the invention allows (but does not require) the stations to be placed closer together, which allows one to thus reduce the travel distance and tray-transfer time, as compared to a system that moved the trays in a direction parallel to the long-dimension side. If, whichever orientation the trays are in, the trays are moved ten inches from one station (e.g., inspection, flip, and inspection) to the next, it would not matter to the distance which direction the trays were moved, however, if the trays were 10 inches wide by 20 inches long, the stations would each need to be spaced 20 inches or more apart to move the trays parallel to the 20" long dimension, but could be placed as close as 10" apart if the trays are moved perpendicular to the long dimension. Alternatively, if the stations are placed 200 inches apart, there can be ten trays in the path between stations if placed and moved parallel to the 20" long dimension, but twenty trays can be placed in the path between stations if oriented and moved parallel to the 10" short dimension. These advantages and their explanation need not be recited in the claim.

The claims do clearly recite the orientation of the tray relative to its direction of travel. Thus, one of an ordinary level of skill in the pertinent art at the time the invention was made is clearly apprised of the scope of the claim.

Rejection Under 35 U.S.C. § 103(a)

1) The Applicable Law for Rejections Under 35 U.S.C. § 103

According to *M.P.E.P.* § 2141, which cites *Hodosh v. Block Drug Co., Inc.*, 786 F.2d 1136, 1143 n.5, 229 U.S.P.Q. 182, 187 n.5 (Fed. Cir. 1986), the following tenets of patent law must be adhered to when applying 35 U.S.C. § 103. First, the claimed invention must be considered as a whole. Second, the references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination. Third, the references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention. Fourth, obviousness is determined using a reasonable expectation of success standard. Under § 103, the scope and content of the prior art are to be determined; differences between the

prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. *M.P.E.P.* § 2141 (citing *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 459 (1966)).

The Examiner has the burden under 35 U.S.C. § 103 to establish a *prima facie* case of obviousness. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *M.P.E.P.* § 2142 (citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)).

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *M.P.E.P.* § 2142 (citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)). The references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. *M.P.E.P.* § 2142 (citing *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985)). In considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom. *M.P.E.P.* § 2144.01 (citing *In re Preda*, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968)). However, if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *M.P.E.P.* § 2143.01 (citing *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)).

In order to take into account the inferences which one skilled in the art would reasonably make, the examiner must ascertain what would have been obvious to one of ordinary skill in the art at the time the invention was made, and not to the inventor, a judge, a layman, those skilled in remote arts, or to geniuses in the art at hand. *M.P.E.P.* § 2141.03 (citing *Environmental Designs*,

Ltd. v. Union Oil Co, 713 F.2d 693, 218 USPQ 865 (Fed. Cir. 1983), *cert. denied*, 464 U.S. 1043 (1984)).

The examiner must step backward in time and into the shoes worn by the hypothetical “person of ordinary skill in the art” when the invention was unknown and just before it was made. In view of all factual information, the examiner must then make a determination whether the claimed invention “as a whole” would have been obvious at that time to that person. Knowledge of applicant’s disclosure must be put aside in reaching this determination, yet kept in mind in order to determine the “differences,” conduct the search and evaluate the “subject matter as a whole” of the invention. The tendency to resort to “hindsight” based upon applicant’s disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art.

M.P.E.P. § 2141.03.

2) *The 35 U.S.C. §103 Rejection of Claims*

Claims 3-10, 12-21, and 27-30, 37-40, 42 were rejected under 35 USC § 103(a) as being unpatentable over Applicant’s admitted prior art [discussed on pages 2-5 of the specification] in view of Jackson et al. (US 6,139,243) . Applicant respectfully traverses. Neither Jackson nor Applicant’s discussion of the prior art provides any previous recognition of a need to move trays in the short direction rather than parallel to the long dimension of the tray.

It is only with the teaching of the present disclosure that this improvement is provided. Applicant’s specification has provided substantial and adequate teaching to provide one of skill in the art a full and complete understanding of the advantages of the claimed invention over the prior art. The prior art is not capable of such advantages. The cited prior art (Jackson) moves the trays parallel to their long dimension. There is no recognition that such an orientation leads to longer distances than possible with the present invention.

The non-obviousness of the present invention is further evidenced by the Examiner’s failure, in earlier Office Actions, to appreciate that moving the trays in a direction parallel to their short dimension would lessen the distance needed to move trays between stations (since the stations could be placed closer to one another) or the per-tray travel time between inspections (if

the stations are kept at a fixed distance apart and more trays are placed along the path between stations). See the Examiner's arguments relative to the *§112 Rejection*.

The Examiner's dismissal of tray orientation as a matter of design choice to one of skill in the art based on criteria such as space optimization is only possible after absorbing the teaching of the present application. Based on the Examiner's own reasoning that orientation of the trays does not affect the distance traveled, the orientation of the trays would not affect the space needed: three trays oriented with their long dimension in the direction of travel take the same area as three trays oriented with their short dimension in the direction of travel. It is only with Applicant's teaching that any such problem (such as shortening the distance of tray travel between stations, or shortening the overall length of the machine in the direction of travel) and solution is provided.

Jackson moves the trays along the tray's long dimension (note Jackson Fig.1 where the axis of rotation 42 is parallel to the direction of tray travel shown by the arrow, and Fig. 4 where the axis of flip rotation 42 is parallel to the long dimension of the tray), thus increasing the time needed to transfer the trays to and from the flip station. In contrast, the present claimed invention of claims 3, 12, and 20 as amended, and their respective dependent claims recite moving the trays (to or from the flip station) in a direction perpendicular to the long side dimension or parallel to the short side dimension of the tray. This short-dimension movement reduces the time of travel, shrinks the footprint size of the conveyor needed, and reduces the jostling and shaking of the devices in the tray due to fast start and stop motions if the trays were moved in the long dimension in the same amount of time (if the devices are moving when moved to the second inspection time due to jostling in the trays, extra time must be wasted to wait for the devices to stop moving so a picture can be taken). Accordingly, claims 3, 12, 17, 20 and 40 and their dependent claims appear in condition for allowance and reversal of the rejection is respectfully requested.

Regarding claim 37 and its dependent claims 38-39 (and claim 3's dependent claim 10), the cited references do not show a pick-and-place device combined with the other elements that generates a tray of all-good parts on the basis of the inspections. Accordingly, claims 37-39 and 10 appear in condition for allowance and reversal of the rejection is respectfully requested.

Regarding claim 40 and its dependent claims 41-42, the cited references do not show a tray-transfer device combined with the other elements that moves the devices from the first inspection station to the second inspection station in a direction substantially perpendicular to the long dimension side of the tray so as to reduce the distance of movement needed. Accordingly, claims 37-39 and 10 appear in condition for allowance and reversal of the rejection is respectfully requested.

Further, claim 40 provides a generic linking claim between independent claims 3, 12, 17, 20, 37 and independent claims 22 and 32, and dependent claim 41. Thus, claim 3 (and its dependent claims 4, 5, 6, 7, 8, 9, 10, and 27), 12 (and its dependent claims 13, 14, 15, 16 and 28), 17 (and its dependent claims 18, 19 and 29), and 20 (and its dependent claims 21 and 30); and independent claims 22 (and its dependent claims 23, 24, 25 and 31) and 32 (and its dependent claims 33, 34, 36) are linked by a generic claim 40.

With regard to the rejection of claim 22, Applicant respectfully traverses any rejection. Jackson discusses flipping the devices from a first tray into a second tray and then passing the second tray. In such a system, any identification or markings on the first tray that are associated with a particular set or batch of devices are no longer associated with the devices once they are placed in the second tray. Neither Jackson nor the Applicant's discussion of the prior art flips the devices and then puts the devices back into the same tray. In contrast, the present Figures 19c-19g show flipping a plurality of devices and then placing them back into the same tray.

Accordingly, the claims appear to be in condition for allowance, and reconsideration and reversal of the rejections is respectfully requested.

Because claim 40 appears in condition for allowance, it provides a generic claim linking the species of claims 41 and 42, and thus to the species of claims 22-25, 31-36. Accordingly, the claims appear to be in condition for allowance, and reconsideration and reversal of the rejection is respectfully requested.

APPEAL BRIEF

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Conclusion

It is respectfully submitted that the claimed invention is not unpatentable in view of the cited art. It is respectfully submitted that claims 3-10, 12-25, and 27-42 should therefore be allowed. Reversal of the Examiner's rejections of claims 3-10, 12-25, and 27-42 is respectfully requested.

Respectfully submitted,
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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Assistant Commissioner of Patents, Washington, D.C. 20231 on September 22, 2003 (Monday).

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Appendix A - The Claims Under Appeal

1-2. (Cancelled)

3. (Previously presented) A machine-vision system for inspecting a device, the device having a first side and a second side, the machine-vision system comprising:

a first inspection station for inspecting a first side of a device;

a second inspection station for inspecting a second side of a device; and

a tray-transfer device that operates to move the device in a tray having a long-dimension side and a short-dimension side from the first inspection station to the second inspection station in a direction perpendicular to the long-dimension side, said tray-transfer device further including an inverting mechanism that operates to invert the device so that the first side of the device can be inspected at the first inspection station and the second side of the device can be inspected at the second inspection station, wherein the inverting mechanism further comprises a mechanism for flipping the devices carried in a tray, the mechanism further comprising:

a first jaw having a surface for receiving a first tray;

a second jaw having a surface for receiving a second tray;

a mover for moving the first jaw, the first tray having a plurality of devices, the second tray, and the second jaw into engagement with each other, said first tray

associated with the first jaw and the second tray associated with the second jaw; and

a rotator for rotating the first and second jaws.

4. (Original) The machine-vision system of claim 3 wherein the mover moves the first jaw in a direction substantially perpendicular to the surface for receiving a tray associated with the first jaw.

5. (Original) The machine-vision system of claim 3 wherein the mover moves the first jaw and the second jaw in a direction substantially perpendicular to the surface for receiving a tray associated with the first jaw.

6. (Previously presented) The machine-vision system of claim 3 wherein the inverting mechanism moves the plurality of devices to the second tray such that the second sides of the plurality of devices are presented for inspection.

7. (Previously presented) The machine-vision system of claim 3 wherein the rotator of the inverting mechanism moves the plurality of devices to the second tray such that the second sides of the plurality of devices are presented for inspection.

8. (Original) The machine-vision system of claim 6 wherein the mover of the inverting mechanism is adapted to place the plurality of devices in the second tray at the second inspection station.

9. (Previously presented) The machine-vision system of claim 8 wherein the tray transfer device includes means for moving the second inspection station with respect to the inverting mechanism.

10. (Original) The machine-vision system of claim 8 further comprising a picker for picking devices which fail inspection from the second tray.

11. (Cancelled)

12. (Previously presented) A machine-vision system for inspecting a plurality of devices positioned within a plurality of device-carrying trays, the machine-vision system comprising:

a first tray adapted to carry a plurality of devices;

a second tray adapted to carry a plurality of devices;

a flip station for flipping the plurality of devices carried in a first tray from a first inspection position in the first tray to a second inspection position in the second tray wherein the flip station further comprises:

a first jaw having a surface for receiving a first tray;

a second jaw having a surface for receiving a tray;

a mover for moving the first jaw, a first tray having a plurality of devices, a second tray, and the second jaw into engagement with each other, said first tray associated with the first jaw and the second tray associated with the second jaw; and

a rotator for rotating the first and second jaws; and

a mover that moves the first tray to the flip station in a direction substantially perpendicular to a longer side of the first tray to reduce a distance of travel of the first tray.

13. (Previously presented) The machine-vision system of claim 12 further comprising:

a first tray-transfer device for holding at least the first tray, said first tray-transfer device moving the first tray from the first inspection station to the flip station; and

a second tray-transfer device for holding at least the second tray, said second tray-transfer device moving the second tray from the flip station to the second inspection station.

14. (Previously presented) The machine-vision system of claim 12 wherein the flip station further comprises a mechanism for flipping the devices carried in a tray, the mechanism further comprising means for limiting the motion of the rotator.

15. (Original) The machine-vision system of claim 12 wherein the mover moves the first jaw in a direction substantially perpendicular to the surface for receiving a tray associated with the first jaw.

16. (Original) The machine-vision system of claim 12 wherein the mover moves the first jaw and the second jaw in a direction substantially perpendicular to the surface for receiving a tray associated with the first jaw.

17. (Previously presented) A flipping mechanism for transferring a plurality of devices from a position in a first tray to a position in a second tray, the flipping mechanism comprising:

a first jaw having a surface adapted to receive the first tray;
a conveyor that moves the first tray to the first jaw in a direction substantially parallel to a shortest side dimension of the first tray;
a second jaw having a surface adapted to receive the second tray;
a mover for moving the first jaw, the first tray, the second tray, and the second jaw into engagement with each other, said first tray associated with the first jaw and the second tray associated with the second jaw; and
a rotator for rotating the first and second jaws.

18. (Previously presented) The flipping mechanism of claim 17 wherein the mover can be controlled to remove the first tray from a first inspection surface.

19. (Previously presented) The flipping mechanism of claim 17 wherein the mover can be controlled to place the second tray at a second inspection surface.

20. (Previously presented) A method for acquiring physical information associated with a plurality of devices placed in a tray, the method comprising the steps of:

inspecting a first side of a device within a first tray;
moving the first tray in a direction substantially perpendicular to a longer side of the first tray to reduce a distance of travel of the first tray to a flip station;
moving a second tray to a position near the first tray;
flipping the first tray and second tray to move the device from the first tray to the second tray and place the device in the second tray so that a second side of the device is presented in the second tray; and
inspecting a second side of the device within the second tray.

21. (Previously presented) The method of claim 20, further including the step of moving the second tray to a second inspection surface in a direction substantially perpendicular to a longer side of the second tray to reduce a distance of travel of the second tray from the flip station.

22. (Previously presented) A machine-vision system for inspecting a plurality of devices and for inverting the plurality of devices from being positioned in a first tray, the machine-vision system comprising:

a first jaw having a surface for receiving the first tray;

a second jaw having a surface;

a mover for moving the first jaw, the first tray having a plurality of devices, and the second jaw into engagement with each other, said first tray associated with the first jaw; and

a rotator that rotates the first and second jaws to a position such that the devices are inverted and supported by the second jaw and are then are placed back into the first tray in the inverted position.

23. (Original) The machine-vision system of claim 22 further comprising;

a first conveyer for moving the first tray having a plurality of devices therein to the first jaw; and

a second conveyer for moving the first tray having a plurality of devices therein from the first jaw.

24. (Original) The machine-vision system of claim 22 wherein the first jaw is capable of holding, in any position, a tray devoid of devices.

25. (Original) The machine-vision system of claim 22 further comprising;

a slider for transferring the inverted devices from the second jaw into the first tray.

26. (Cancelled)

27. (Previously presented) The machine-vision system of claim 3 wherein the rotator rotates the first and second jaws simultaneously.

28. (Previously presented) The machine-vision system of claim 12 wherein the rotator rotates the first and second jaws simultaneously.

29. (Previously presented) The flipping mechanism of claim 17 wherein the rotator rotates the first and second jaws simultaneously.

30. (Previously presented) The method of claim 20, wherein moving the second tray to the position near the first tray further includes moving the second tray to engage the first tray, and wherein flipping the first tray and second tray is done simultaneously after engagement.

31. (Previously presented) The machine-vision system of claim 22 wherein the rotator rotates the first and second jaws simultaneously.

32. (Previously presented) A machine-vision system for inspecting a plurality of devices, each device having a first side and a second side, the machine-vision system comprising:

a first inspection station for inspecting a first side of the devices held in a tray;

a second inspection station for inspecting a second side of the devices held in the tray;

and

a tray-transfer device that operates to move the devices from the first inspection station to the second inspection station, said tray-transfer device further including an inverting mechanism that operates to invert the devices and place the devices back into the same tray so that the first side of the devices can be inspected at the first inspection station in the tray and the second side of the device can be inspected at the second inspection station in the tray.

33. (Previously presented) The system of claim 32 wherein the tray has a long dimension side and a short dimension side, and is moved from the first inspection position to the inverting mechanism in a direction substantially perpendicular to the long dimension side so as to reduce the amount of movement needed.

34. (Previously presented) The system of claim 33 wherein the inverting mechanism is positioned between the first inspection position and the second inspection position, and wherein the tray has a long dimension side and a short dimension side, and is moved from the first inspection position to the inverting mechanism and to the second inspection position in a direction substantially perpendicular to the long dimension side so as to reduce the amount of movement needed.

35. (Previously presented) A machine-vision system for inspecting a plurality of devices positioned within a plurality of device-carrying trays, the machine-vision system comprising:
a first tray adapted to carry a plurality of devices;
a flip station for flipping the plurality of devices carried in the first tray from a first inspection position in the first tray to a second inspection position in the first tray.

36. (Previously presented) The machine-vision system of claim 34, wherein the flip station further comprises a mechanism for flipping the devices while the devices are carried in a tray.

37. (Previously presented) A machine-vision system for inspecting a device, the device having a first side and a second side, the machine-vision system comprising:
a first inspection station for inspecting a first side of a plurality of devices;
a second inspection station for inspecting a second side of the plurality of devices;
a tray-transfer device that operates to move the devices in a tray from the first inspection station to the second inspection station, said tray-transfer device further including an inverting mechanism that operates to invert the devices so that the first side of the devices are inspected at the first inspection station and the second side of the devices are inspected at the second inspection station, wherein the inverting mechanism further comprises a mechanism for flipping the devices carried in a tray, the mechanism further comprising:
a first jaw having a surface for receiving a first tray;
a second jaw having a surface for receiving a second tray;

a mover that moves the second jaw such that the second tray comes into engagement with the first tray, said first tray associated with the first jaw and the second tray associated with the second jaw; and

a rotator for rotating the first and second jaws; and

a pick-and-place mechanism that removes rejected devices that fail an inspection at the first or second inspection station from the second tray and replaces the removed devices with good devices that passed inspection, in order to achieve an all-good tray of devices.

38. (Previously presented) The system of claim 37, wherein the first inspection station is a three-dimensional scanning station that provides height measurements for a plurality of points on a first side each device.

39. (Previously presented) The system of claim 38, further comprising a third inspection station that provides two-dimensional measurements for a plurality of points on the first side each device.

40. (Previously presented) A machine-vision system for inspecting a plurality of tray-held devices, each device having a first side and a second side, the machine-vision system comprising:
a first inspection station for inspecting a first side of the devices held in a tray that has a long-dimension side and a short-dimension side;

a second inspection station for inspecting a second side of the devices; and

a tray-transfer device that operates to invert the devices and move the devices from the first inspection station to the second inspection station in a direction substantially perpendicular to the long dimension side of the tray so as to reduce the distance of movement needed.

41. (Previously presented) The system of claim 40 wherein tray-transfer device operates to invert the devices and place the devices back into the same tray so that the first side of the devices can be inspected at the first inspection station in the tray and the second side of the device can be inspected at the second inspection station in the same tray.

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42. (Previously presented--Renumbered) The system of claim 40 wherein tray-transfer device operates to invert the devices and place the inverted devices into a different tray than that used at the first inspection station.